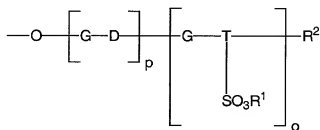
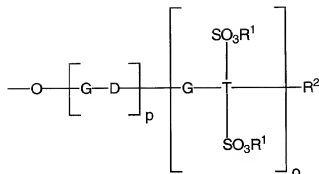


**That which is claimed is:**

1. A comb polymer that is water-soluble, or water-dispersible, or both, comprising a polymer main chain and polyester side-arms which contain sulphone groups and are linked to said polymer main chain via ester groups, which side-arms have been at least partially neutralized by sodium and lithium counterions, wherein the molar ratio of lithium to sodium is between 0.1 and 50.
2. The comb polymer according to Claim 1, wherein the molar ratio of lithium to sodium is between 0.5 and 25.
3. The comb polymer according to Claim 1, wherein the polymer main chain comprises at least one polymer selected from polymeric aliphatic, cycloaliphatic and aromatic polycarboxylic acids and derivatives thereof.
4. The comb polymer according to Claim 3, wherein the polymeric polycarboxylic acids and derivatives thereof comprise at least one of polyacrylic acid, polymethacrylic acid, esters of polyacrylic acid or polymethylacrylic acid with at least one C<sub>1</sub>-C<sub>22</sub> aliphatic, cycloaliphatic or aromatic alcohol, maleic acid, maleic anhydride, fumaric acid or polynorbornenic acid.
5. The comb polymer according to Claim 1, wherein the polyester side arms comprise at least one polyester selected from:

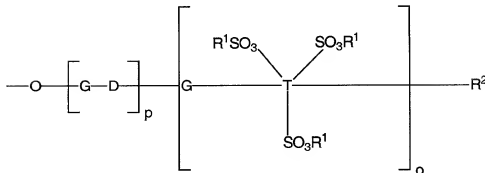


Formula I



Formula II

and

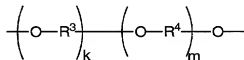


Formula III

wherein:

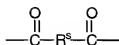
p and o are selected so that the average molecular weight of the comb polymer is between 200 and 2,000,000 g/mol;

G is selected from C<sub>2</sub> to C<sub>22</sub> aromatic, aliphatic and cycloaliphatic organyl units containing at least two terminal oxygen atoms, or derivatives of a polyglycol of the formula HO-[R<sup>3</sup>-O]<sub>k</sub>-[R<sup>4</sup>-O]<sub>m</sub>-H, corresponding to an organyl unit



wherein R<sup>3</sup> and R<sup>4</sup> are each C<sub>2</sub>-C<sub>22</sub> alkylene radicals, and can be the same or different and k+m ≥ 1, wherein k and m are selected so that the average molecular weight of the comb polymer is between 200 and 2,000,000 g/mol;

D is selected from C<sub>2</sub> to C<sub>22</sub> aromatic, aliphatic and cycloaliphatic organyl units containing at least two terminal acyl groups, optionally including combinations of two or more different acid components comprising an organyl unit of the formula



wherein  $R^s$  is selected from  $C_2$  to  $C_{22}$  aromatic and linear or cyclic, saturated or unsaturated aliphatic bifunctional radicals;

T is selected from sulphonated aromatic, aliphatic and cycloaliphatic organyl compounds containing at least two terminal acyl groups;

$R^1$  is selected from lithium, sodium and mixtures thereof, and optionally further includes one or more additional counterions; and

10  $R^2$  is selected from:

- aromatic, aliphatic and cycloaliphatic amino functional groups  $\text{-NH-R}^5$  or  $\text{-NR}^5_2$ , wherein  $R^5$  is selected from  $C_1$  to  $C_{22}$  alkyl and aryl radicals;

- aromatic, aliphatic and cycloaliphatic monocarboxylic acid groups  $\text{-COOR}^6$ , wherein  $R^6$  is selected from  $C_1$  to  $C_{200}$  alkyl and aryl radicals;

15 - aromatic, aliphatic and cycloaliphatic organyl radicals bridged via ether functions  $\text{-O-R}^5$ , wherein  $R^5$  is the same as defined above;

- polyalkoxy compounds bridged via ether functions of the formula  $\text{-O-[R}^7\text{-O]}_q\text{-[R}^8\text{-O]}_r\text{-Y}$ , wherein  $R^7$  and  $R^8$  are each independently selected from  $C_2$  to  $C_{22}$  alkyl radicals and can be the same or different, Y is hydrogen or a  $C_1$ - $C_{22}$  aliphatic radical, and  $q+r \geq 1$ ; and

20

- mono- or polyethoxylated sulphonated organyl radicals bridged via ether functions, and alkali metal or alkaline earth metal salts thereof.

6. The comb polymer according to Claim 5, wherein p and o are selected so that the average molecular weight of the comb polymer is between 2000 and

25 100,000 g/mol.

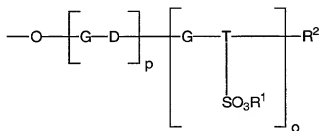
7. The comb polymer according to Claim 5, wherein said one or more additional counterions of  $R^1$  are selected from potassium, magnesium, calcium, ammonium, monoalkylammonium, dialkylammonium, trialkylammonium and tetraalkylammonium, wherein the alkyl positions of the amines, independently of one

30 another, comprise a  $C_1$  to  $C_{22}$ -alkyl radical and 0 to 3 hydroxyl groups.

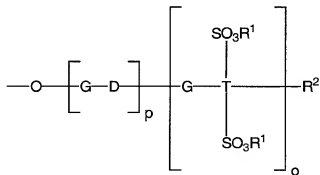
8. The comb polymer according to Claim 5, wherein said mono- or polyethoxylated sulphonated organyl radicals bridged via ether functions of  $R^2$  comprise a radical of the formula  $-(O-CH_2-CH_2)_s-SO_3R^1$ , wherein  $s \geq 1$  and is selected so that the average molecular weight of the comb polymer is between 200 and
- 5 2,000,000 g/mol.
9. The comb polymer according to Claim 1, wherein the average molecular weight of the comb polymer is between 200 and 2,000,000 g/mol.
10. The comb polymer according to Claim 9, wherein the average molecular weight of the comb polymer is between 2000 and 100,000 g/mol.
- 10 11. The comb polymer according to Claim 10, wherein the average molecular weight of the comb polymer is between 1000 and 30,000 g/mol.
12. The comb polymer according to Claim 11, wherein the average molecular weight of the comb polymer is between 5000 and 15,000 g/mol.
13. A hair treatment composition comprising an effective amount of one or
- 15 more comb polymers that are water-soluble, or water-dispersible, or both, comprising a polymer main chain and polyester side-arms which contain sulphone groups and are linked to said polymer main chain via ester groups, which side-arms have been at least partially neutralized by sodium and lithium counterions, wherein the molar ratio of lithium to sodium is between 0.1 and 50.
- 20 14. The hair treatment composition according to Claim 13, wherein the molar ratio of lithium to sodium is between 0.5 and 25.
15. The hair treatment composition according to Claim 13, wherein the polymer main chain comprises at least one polymer selected from polymeric aliphatic, cycloaliphatic and aromatic polycarboxylic acids and derivatives thereof.
- 25 16. The hair treatment composition according to Claim 15, wherein the polymeric polycarboxylic acids and derivatives thereof comprise at least one of polyacrylic acid, polymethacrylic acid, esters of polyacrylic acid or polymethacrylic acid with  $C_1$ - $C_{22}$  aliphatic, cycloaliphatic or aromatic alcohol, maleic acid, maleic

anhydride, fumaric acid and polynorbornenic acid.

17. The hair treatment composition according to Claim 13, wherein the polyester side arms comprise at least one polyester selected from:

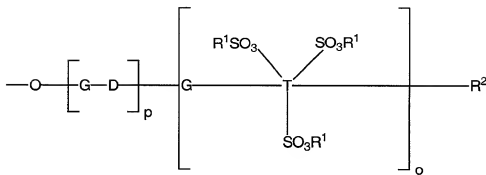


Formula I



Formula II

and

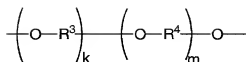


Formula III

wherein:

p and o are selected so that the average molecular weight of the comb polymer is between 200 and 2,000,000 g/mol;

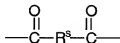
15 G is selected from C<sub>2</sub> to C<sub>22</sub> aromatic, aliphatic and cycloaliphatic organyl units containing at least two terminal oxygen atoms, or derivatives of a polyglycol of the formula HO-[R<sup>3</sup>-O]<sub>k</sub>-[R<sup>4</sup>-O]<sub>m</sub>-H, corresponding to an organyl unit



wherein  $\text{R}^3$  and  $\text{R}^4$  are each  $\text{C}_2$ - $\text{C}_{22}$  alkylene radicals, and can be the same or different  
 5 and  $k+m \geq 1$ , wherein  $k$  and  $m$  are selected so that the average molecular weight of the comb polymer is between 200 and 2,000,000 g/mol;

$\text{D}$  is selected from  $\text{C}_2$  to  $\text{C}_{22}$  aromatic, aliphatic and cycloaliphatic organyl units containing at least two terminal acyl groups, optionally including combinations of two or more different acid components comprising an organyl unit of the formula

10



wherein  $\text{R}^8$  is selected from  $\text{C}_2$  to  $\text{C}_{22}$  aromatic and linear or cyclic, saturated or unsaturated aliphatic bifunctional radicals;

15

$\text{T}$  is selected from sulphonated aromatic, aliphatic and cycloaliphatic organyl compounds containing at least two terminal acyl groups;

$\text{R}^1$  is selected from lithium, sodium and mixtures thereof, and optionally further includes one or more additional counterions; and

$\text{R}^2$  is selected from:

20

- aromatic, aliphatic and cycloaliphatic amino functional groups  $-\text{NH}-\text{R}^5$  or  $-\text{NR}^5_2$ , wherein  $\text{R}^5$  is selected from  $\text{C}_1$  to  $\text{C}_{22}$  alkyl and aryl radicals;

- aromatic, aliphatic and cycloaliphatic monocarboxylic acid groups  $-\text{COOR}^6$ , wherein  $\text{R}^6$  is selected from  $\text{C}_1$  to  $\text{C}_{200}$  alkyl and aryl radicals;

25

- aromatic, aliphatic and cycloaliphatic organyl radicals bridged via ether functions  $(-\text{O}-\text{R}^5)$ , wherein  $\text{R}^5$  is the same as defined above;

- polyalkoxy compounds bridged via ether functions of the formula  $-\text{O}-[\text{R}^7-\text{O}]_q-[\text{R}^8-\text{O}]_r-\text{Y}$ , wherein  $\text{R}^7$  and  $\text{R}^8$  are each independently selected from  $\text{C}_2$  to  $\text{C}_{22}$  alkyl radicals and can be the same or different,  $\text{Y}$  is hydrogen or a  $\text{C}_1$ - $\text{C}_{22}$  aliphatic radical, and  $q+r \geq 1$ ;

30

- mono- or polyethoxylated sulphonated organyl radicals bridged via

ether functions, and alkali metal or alkaline earth metal salts thereof.

18. The hair treatment composition according to Claim 17, wherein p and o are selected so that the average molecular weight of the comb polymer is between 2000 and 100,000 g/mol.

5 19. The hair treatment composition according to Claim 17, wherein said one or more additional counterions of R<sup>1</sup> are selected from potassium, magnesium, calcium, ammonium, monoalkylammonium, dialkylammonium, trialkylammonium or tetraalkylammonium, wherein the alkyl positions of the amines, independently of one another, comprise a C<sub>1</sub> to C<sub>22</sub>-alkyl radical and 0 to 3 hydroxyl groups.

10 20. The hair treatment composition according to Claim 17, wherein said mono- or polyethoxylated sulphonated organyl radicals bridged via ether functions of R<sup>2</sup> comprise at least one radical of the formula  $-(O-CH_2-CH_2)_s-SO_3R^1$ , wherein s ≥ 1 and is selected so that the average molecular weight of the comb polymer is between 200 and 2,000,000 g/mol.

15 21. The hair treatment composition according to Claim 13, wherein the average molecular weight of the comb polymer is between 200 and 2,000,000 g/mol.

22. The hair treatment composition according to Claim 21, wherein the average molecular weight of the comb polymer is between 2000 and 100,000 g/mol.

20 23. The hair treatment composition according to Claim 22, wherein the average molecular weight of the comb polymer is between 1000 and 30,000 g/mol.

24. The hair treatment composition according to Claim 23, wherein the average molecular weight of the comb polymer is between 5000 and 15,000 g/mol.

25 25. The hair treatment composition according to Claim 13, wherein said hair treatment composition is a hair setting composition selected from aerosol and non-aerosol hair sprays, hair lacquers, setting foams, setting liquids, and styling gels.

26. The hair treatment composition according to Claim 25, comprising one or more of the comb polymers in an amount between 0.5 and 30 percent by weight based on the total weight of the composition.

27. The hair treatment composition according to Claim 13, wherein said hair treatment composition is shampoo.